



US Army Corps  
of Engineers

# DCAF Bulletin

Design Construction Analysis Feedback

No. 95-04

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CEMP-CE Construction/Design

Subject: MASONRY BOND BEAMS

Applicability: Directive

1. Unit masonry is designed structurally to resist the usual forces to which a building is subjected, as well as seismic forces. In order to do this, masonry is typically reinforced with grout and re-bar for axial, flexural and shear loads as determined by the designer. Bond beams are an integral part of the reinforced structural system in masonry walls. It is crucial that they be adequately designed and constructed.

2. One of the most common deficiencies noted on recent Design-Construction Evaluations(DCE) is the lack of continuity at the corners and wall intersections. In order to be structurally effective, bond beams must be continuous at the corner. Also, intermediate wall intersections should have continuous reinforcement unless a control joint is located there.

3. Standard details of bond beam intersections are being omitted from the contract drawings. The omission of these details leaves the design of these intersections to the contractor. This usually results in a discontinuity of the bond beam at each corner and wall intersection. Design of this feature should not be left to the contractor's discretion. It is too important. The continuity, or lack thereof of the bond beams, influences the capacity of the wall to resist lateral loading. This design must be reflected on the contract drawings. A book of standard details entitled "Masonry Details", Detail No 000-90-04, December 1992, is available from Huntsville Division, CEHND-ED-EF-1. Design Branch in each district should obtain a copy of this publication, and should make sure that the A-E design firm is given a copy of pertinent details for inclusion in the contract drawings. CEGS 04200 has the following instruction:

"Details will be shown on the drawings which illustrate corners and intersections of structural bond beam reinforcement ....". BCOE reviewers should insure that these details are included in the contract so the contractor is not required to assume a design. (See enclosure 1&2).

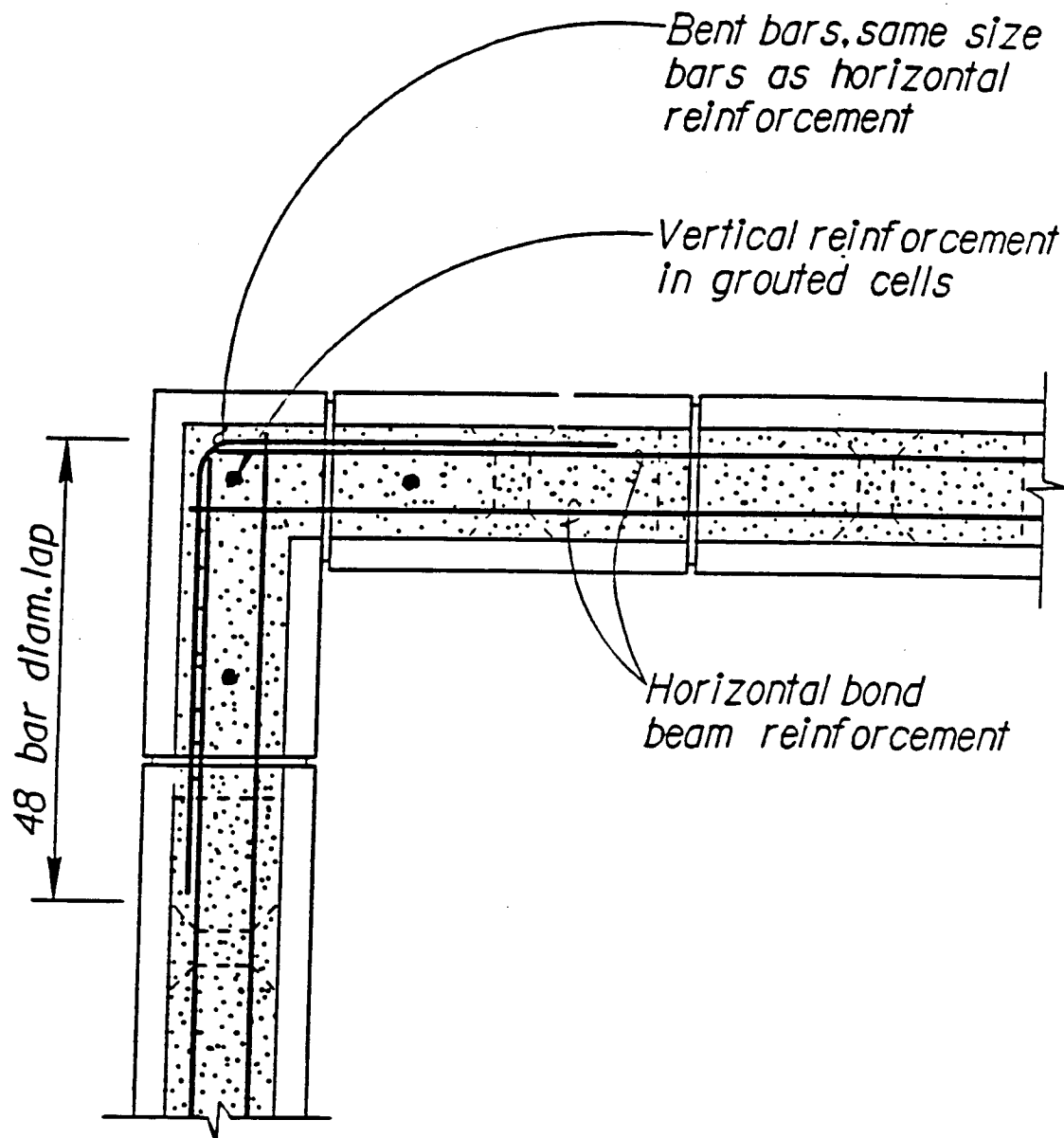
Another deficiency frequently noted on DCE's is the use of mortar instead of grout in the bond beams, and even in the reinforced vertical cells. This is typically done when the mortar starts getting old and stiff, and the mason puts it in the bond beam or the vertical cells to get rid of it. Mortar is made up of cement, lime, sand and water. Lime as a component of mortar allows it to hold the water longer, and to stay workable (5 to 8 inch slump). Once the water is added to the dry components of the mortar, two things happen to it: It reacts with the portland cement, and it evaporates. The mason periodically retempers the mortar to replace the water lost by evaporation. However, CEGS 04200 does not allow the mortar to be used after 2 ½ hrs. At this time most of the water has reacted with the cement. The mortar is essentially "dead" and it cannot form an adequate bond with either the block or the rebar. Obviously, it is not the kind of material with which to reinforce a masonry wall.

Grout as a component of reinforced masonry is often not fully understood. It is actually a high slump concrete (8 to 10 inch slump), with characteristics of both mortar and concrete. It is made up of cement, water, sand and sometimes pea gravel. The main difference between grout, mortar and concrete is the fluidity of the initial mix. This fluidity lets the grout flow through the masonry cell, around the rebar and completely surround and bond to the steel and the masonry unit, rendering it a viable structural member. Any dead mortar that displaces this grout reduces the strength of this member. CEGS 04200 requires removal of all mortar that protrudes more than ½ inch into a grout space. Mortar is not grout. Using it in place of grout is not acceptable and seriously affects the structural integrity of the wall. This distinction should be covered in detail at the Preparatory Inspection.



CHARLES R. SCHROER

Chief, Construction Division

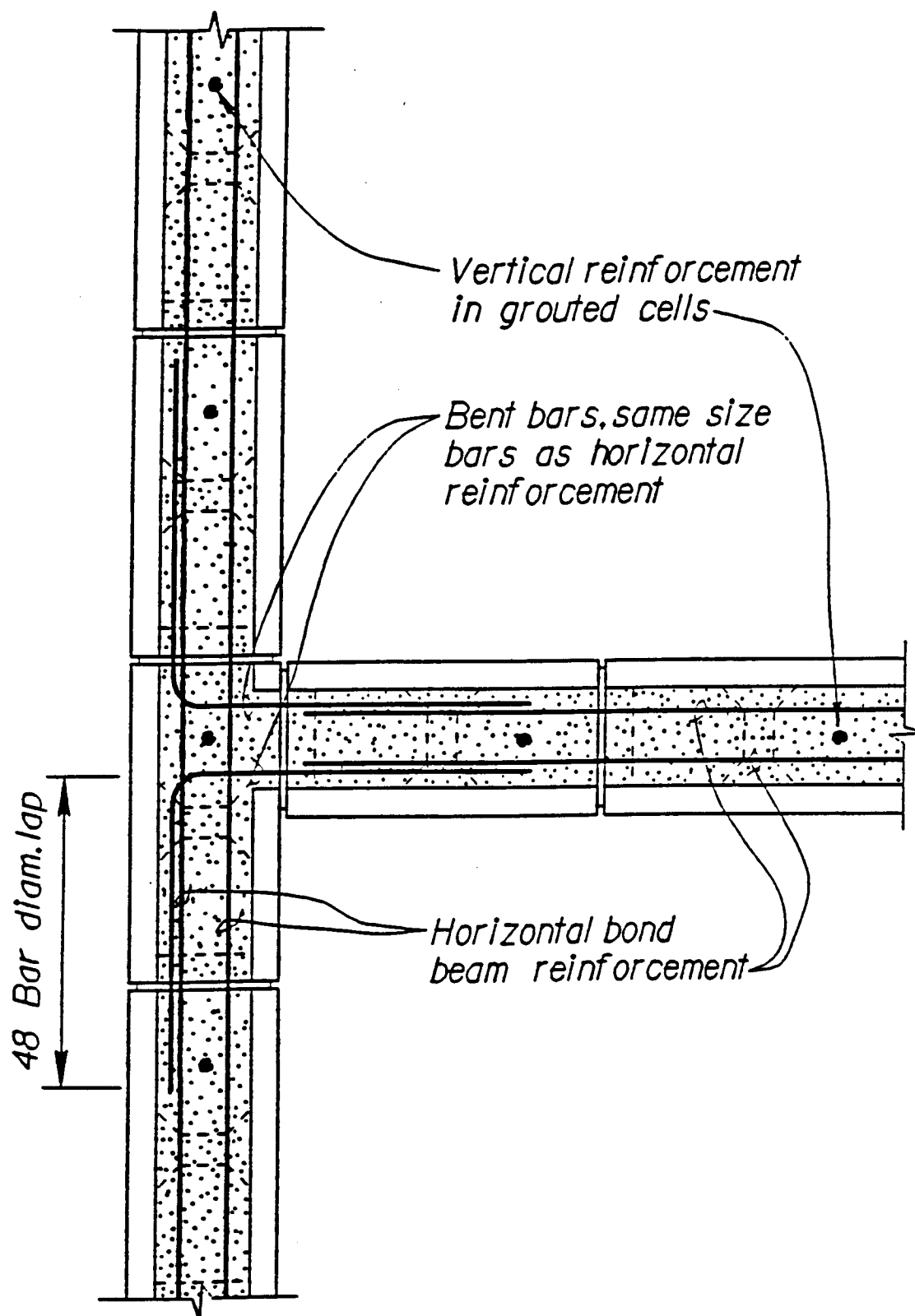


DESCRIPTION: BOND BEAM CORNER

ENCL. 1

DETAIL NO. 6.1

SCALE:  $1\frac{1}{2}''=1'$



DESCRIPTION: BOND BEAM INTERSECTION

DETAIL NO. 6.2

ENCL. 2SCALE:  $1\frac{1}{2}'' = 1'$